Analytical and Simulation Framework for Performance Validation of Complex Systems, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

To remain competitive, the US aerospace industry must continually improve system performance (e.g. increased adaptation and autonomy), enhance safety (e.g., fault tolerant systems), and reduce costs. These improvements demand avionics software that is orders of magnitude more complex than that used in current operational systems. While software complexity is increasing, there is a tremendous (and appropriate) pressure to ensure that new designs are safer to operate than the simpler systems they replace. In many cases (e.g., damage-adaptive control), methods that can improve vehicle performance are not used because verification and validation (V&V) tools that help ensure the complex system will not behave in an unexpected way are not available. The proposed research will lay the groundwork for such a tool by building on prior work by the authors in four unique areas: (1) the tool will work in the MATLAB/Simulink environment and will be easy to set up and operate, (2) the tool will be modular and allow easy integration of a variety of closed-form analysis methods, (3) the tool will aid in evaluating system performance as well as stability, and (4) the tool will assist in piloted simulation and flight test design.

Primary U.S. Work Locations and Key Partners
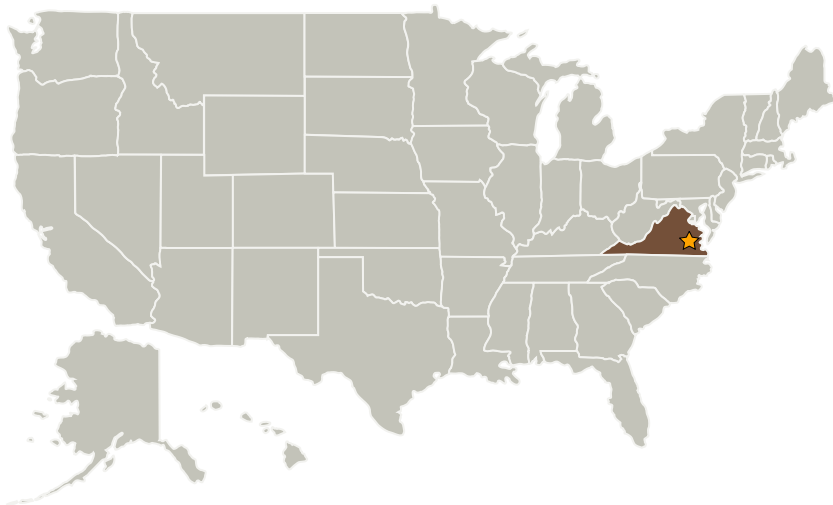
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Organizations Performing Work	Role	Type	Location
⭐Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Barron Associates, Inc.	Supporting Organization	Industry	Charlottesville, Virginia

Primary U.S. Work Locations
Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alec Bateman

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
  └ TX15.2 Flight Mechanics
    └ TX15.2.2 Flight Performance and Analysis